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## Original Research Article

# Birth outcomes for infants born to mothers with COVID-19 at a tertiary care hospital in Telangana

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## ABSTRACT

**Introduction:** The coronavirus disease 2019 (COVID-19) pandemic has primarily affected adults of higher age groups, and the effect of the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) appears to be less severe in infants and neonates. This study aims to evaluate the clinical manifestations, management, and short-term outcomes of SARS-CoV-2 neonates born to mothers with COVID-19 in a tertiary care hospital in Telangana, India.

**Materials and Methods:** The study is an observational study of neonates born to COVID-19-positive mothers delivered at Gandhi Hospital, Hyderabad, Telangana from 1st July 2020 to 31<sup>st</sup> May 2021.

**Results:** Infection with SARS-CoV-2 was detected in 2.06 percent of neonates born to covid positive mothers. About 12.5% of those were symptomatic, with respiratory distress syndrome as the most common clinical manifestation. Symptomatic treatment was usually effective, and most neonates were discharged.

**Conclusion:** The COVID-19 virus rarely affects the fetus during pregnancy and has low neonatal mortality, but is associated with adverse neonatal morbidity. Vertical transmission has not been observed in the majority of reported cases. A COVID-19 vaccine provides the best protection against the known risks of pregnancy for women and babies, including admission to the intensive care unit and preterm birth.

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## 1. Introduction

The coronavirus disease 2019 (COVID-19) pandemic has primarily affected adults of higher age groups, and the effect of the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) appears to be less severe in infants and neonates.<sup>1</sup>

Nearly one-fifth of the world's childbirths<sup>2</sup> take place in India, suggesting a large number of neonates might be infected with SARS-CoV-2.

SARS-CoV-2 infected neonates were defined as those with a positive SARS-CoV-2 quantitative RT-PCR test in nasopharyngeal swab within 28 days of birth.<sup>3</sup>

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Neonates may be exposed to SARS-CoV-2 via respiratory droplets in the postnatal period when they are exposed to mothers or caregivers with SARS-CoV-2 infection. Limited reports in the literature have raised the concern of possible intrauterine, intrapartum, or peripartum transmission, but the extent and clinical significance of vertical transmission, which appears to be rare, is unclear.<sup>4</sup>

Among neonates infected with SARS-CoV-2, fever, lethargy, rhinorrhoea, cough, tachypnoea, vomiting, diarrhea, and poor feeding are reported.<sup>4</sup> As many of these findings (e.g., transient tachypnoea of the new-born, neonatal respiratory distress syndrome) occur in term and preterm infants for other reasons, the causal contribution of SARS-CoV-2 infection to these findings is unclear.<sup>4</sup>

Current evidence suggests that SARS-CoV-2 infections in neonates are uncommon. In most cases, newborns

who become infected, develop asymptomatic infections or mild diseases (i.e., supplemental oxygen inhalation was not required), which they recover from. Severe illness in neonates, including illness requiring mechanical ventilation, has been reported but appears to be rare. COVID-19 may pose a greater threat to preterm infants (<37 weeks gestational age) and neonates with underlying medical conditions.<sup>4</sup>

Because of relatively higher premature birth rates in pregnant women with COVID-19 than the worldwide average,<sup>5</sup> neonatal morbidity and mortality are suspected to be due to prematurity rather than SARS-CoV-2 infection of new-borns. However, SARS-CoV-2 infection during pregnancy might lead to hypoxemia or respiratory failure, which causes fetal distress, stillbirth, and preterm labor, and for the need for premature delivery by cesarean section to improve maternal ventilation.<sup>6</sup>

However, knowledge of neonatal outcomes when mothers are infected with Coronavirus Disease (COVID-19) during pregnancy is still limited to several case reports and case series.

## 2. Materials and Methods

### 2.1. Study design and procedures

The study was a retrospective analysis of the neonates born to mothers with COVID-19 admitted and delivered at Gandhi Hospital, Hyderabad, Telangana. Data on 1183 neonates born at Gandhi hospital (GH) to mothers with COVID-19 from 1st July 2020 to 31st May 2021 were collected from the registry.

During aerosol-generating procedures, healthcare workers involved in the delivery of COVID-19 positive mothers wore personal protective equipment, including N-95 masks, face shields, and eye protection goggles, to minimize virus spread. The mode of delivery of Pregnant mothers is according to their obstetric indication. In vigorous babies, we practiced delayed cord clamping and immediate skin-to-skin contact. Mothers performed hand hygiene and wore a mask. Baby who were in need of resuscitation were immediately shifted under a prewarmed radiant heat warmer in the designated new born resuscitation room with a minimum number of personnel attending (one doctor for low-risk cases and two for complicated cases). COVID-19 status did not alter the indications for intubation.<sup>7</sup>

For all babies, a nasopharyngeal swab was sent for a real-time reverse transcription-polymerase chain reaction (RT-PCR) assay for SARS-CoV-2. From 1st July 2020 to 31st May 2021, swabs were sent within 24-48 hours of delivery. If the swab was negative and the baby was asymptomatic no further testing was done.

All stable newborns were kept in the postnatal ward with mothers irrespective of their COVID-19 status

(Zero separation policy).<sup>8,9</sup> Exclusive breastfeeding were followed in neonates. The antibiotics were given only if indicated in clinically suspected sepsis or proven sepsis.<sup>8</sup> The resuscitation guidelines for newborns were followed.<sup>8-10</sup> Discharge of mother and baby was done as per the ICMR COVID-19 guidelines with adequate counselling. Symptomatic SARS-CoV-2 infected neonates were shifted into a designated COVID-19 NICU having a dedicated separate team of health care workers where IPC control measures were strictly followed.

New-born data were captured from the case sheets which included gestational age, mode of delivery, birth weight, sex, clinical symptoms, laboratory and radiological characteristics, diagnosis with SARS-CoV-2 infection, treatment, and neonatal outcomes.

The categorical data has been presented as frequencies and percentages and a statistical analysis was performed using IBM SPSS Statistics Base version 26.0 (SPSS South Asia Pvt Ltd, Bangalore).

## 3. Results

Total 1160 live births occurred during the study period of which 409 were vaginally delivered and 751 through cesarean section. The nasopharyngeal swab was collected in 1160 newborns.

Twenty-four of the 1160 neonates (2.06%) were positive for SARS-CoV-2 by RT-PCR while the others were negative during the stay in the hospital. We observed the presentation and the outcomes of these 24 SARS-CoV-2 positive neonates born to mothers with COVID-19.

Three of the 24 SARS-CoV-2 positive neonates were symptomatic (12.5%) while the others (87.5%) were asymptomatic.

Presentations and outcomes in SARS-CoV-2 positive neonates. The majority (79.2%, 19 out of 24) were born at full-term gestation and only 20.8% (5/24) were born as preterm. Nearly 83.3% newborns had birth weight >2.5 kg, 16.7% had 1.5–2.5 kg and 0% had less than 1.5 kg. Most of the babies (95.8%) cried immediately after birth.

Mostly reported covid positive infants born to COVID-19 confirmed mothers were asymptomatic (21 of 24 cases, 87.5%). The most common clinical manifestations included respiratory distress syndrome (RDS, 12.5%), jaundice (4.2%), seizures (4.2%), sepsis (4.2%), feeding intolerance (4.2%), and gastrointestinal symptoms were not seen (e.g. vomiting). Four out of 24 (16.7%) required oxygen support. One neonate who was delivered prematurely needed resuscitation because of birth asphyxia. He was treated and showed improvement with antibiotics, non-invasive ventilation, and caffeine for respiratory distress syndrome. None of the neonates required mechanical ventilation. One neonate was born with congenital anomaly gross hydrocephalus with meningomyelocele for which the baby was operated on and discharged healthily. One of

the neonates showed Radiologically confirmed pneumonia (4.2%). Oseltamivir is used in 45.8% of cases (11 of 24). Antibiotics are required in 8.3% of cases.

**Table 1:** Demographic characteristics of neonates born to mothers with COVID-19

Characteristics	Total SARS-CoV-2 infected Neonates n=24(%)
Male	12 (50%)
Female	12 (50%)
Term Delivery	19 (79.2%)
Preterm Delivery	5 (20.8%)
Birth Weight >2500g	20 (83.3%)
Birth Weight 1500-2500g	4 (16.7%)
Primipara	7 (29.2%)
Multipara	17 (70.8%)
Vaginal Delivery	12 (50%)
LSCS	12 (50%)
Meconium-stained liquor	2 (8.3%)
Breastfeeding	24 (100%)

**Table 2:** Clinical presentations in neonates born to mothers with COVID-19

Characteristics	Total SARS-CoV-2 infected Neonates n=24(%)
Asymptomatic	21 (87.5%)
Congenital Anomalies	1 (4.2%)
Asphyxia	1 (4.2%)
Respiratory Distress Syndrome	3 (12.5%)
Cyanosis	0 (0%)
Jaundice	1 (4.2%)
Feeding Intolerance	1 (4.2%)
Vomiting	0 (0%)
Seizures	1 (4.2%)
Sepsis	1 (4.2%)
Radiologically confirmed Pneumonia	1 (4.2%)
Encephalopathy	0 (0%)
Mortality	0 (0%)

#### 4. Discussion

We analysed the clinical characteristics of neonates born to COVID-19 mothers and found that the rate of SARS-CoV-2 infection in neonates is 2.06% and is similar to a study by S.H. Yoon et al<sup>11</sup> and less compared to the study reported by Sushma Malik et al<sup>7</sup> (6.3%). In our study, nearly 20.8% of the neonates were born as preterm which is similar to what was reported by NNF India COVID-19 Registry (20.7%)<sup>12</sup> and UK Registry<sup>13</sup> and more than that reported previously which has suggested lower rates of preterm birth in SARS-CoV-2 infected women<sup>7</sup> (4.8%). In a study by S.H. Yoon et al. prematurity rate of 25.9% was found.<sup>11</sup>

**Table 3:** Management of neonates born to mothers with COVID-19

Characteristics	Total SARS-CoV-2 infected Neonates n=24(%)
Neonatal Resuscitation	1 (4.2%)
Oxygen Therapy	4 (16.7%)
CPAP Support	1(4.2%)
Ventilatory Support	0 (0%)
Surfactant Support	0 (0%)
Steroids	0 (0%)
Oseltamivir	11 (45.8%)
Antibiotics	2 (8.3%)
IVIG	0 (0%)
Ionotropes	0 (0%)

**Table 4:**

Characteristics	Total SARS-CoV-2 infected Neonates n=24(%)
Hospital Stay (1-5 days)	10 (41.7%)
Hospital Stay (5-10 days)	10 (41.7%)
Hospital Stay (10-15 days)	3 (12.5%)
Hospital Stay (>15 days)	1 (4.2%)
Readmission	1 (4.2%)

Mostly reported covid positive infants born to COVID-19 confirmed mothers were asymptomatic (87.5%) and the most common clinical manifestations being respiratory distress syndrome (RDS, 12.5%). In our study neonates didn't show any gastro intestinal symptoms. In contrast study by S.H. Yoon et al<sup>11</sup> showed typical features of pneumonia, such as fever and shortness of breath in half (50%), and the most frequently reported clinical manifestation was vomiting (75%).

The results of the study showed no significant difference between the proportion of males and females as predisposing factors to COVID-19. This observation was similar to the study reported by Dong et al.<sup>14</sup> showing that sex did not affect the incidence or severity of COVID-19.

Since we did not analyse the amniotic fluid or placenta, it is hard to comment if COVID-19 is vertically transmitted or acquired postnatally.

Most of the women who test positive for COVID-19 in pregnancy have no symptoms at all but some pregnant women present with a life-threatening illness from COVID-19, particularly if they have underlying health conditions. In the later stages of pregnancy, women are at increased risk of becoming seriously unwell with COVID-19.<sup>15</sup>

In pregnant women with symptoms of COVID-19, it is twice as likely that their baby will be born early, exposing the baby to the risk of prematurity.

At present, COVID-19 vaccines are recommended in pregnancy. Vaccination is the best precaution against known risks of COVID 19 during pregnancy, such as ICU admission and preterm birth.

The benefits of vaccination include:

1. Reduction in severe disease for the pregnant woman
2. Reduction in the risk of stillbirth and prematurity for the baby
3. Potential infection transmissions can be minimized to vulnerable household members.<sup>15</sup>

Reasons for the disparity in serious disease between newborns, children, and older adults are not fully understood, although differences in immune function have been described.<sup>16–18</sup>

Decreased angiotensin-converting enzyme 2 levels in the nasopharyngeal epithelium and less vigorous interleukin-6 responses during SAR-CoV-2 infection may contribute to the clinical picture.<sup>19</sup> In contrast to the relatively naive neonatal immune system, older adults have an altered response to inflammatory stimuli termed “inflammaging” and thymic involution.<sup>20</sup>

## 5. Conclusion

In the present study, the number of confirmed COVID-19 cases in newborns is little, and the prognosis for newborns infected with COVID-19 is found to be good. Nevertheless, COVID-19 during pregnancy might cause severe neonatal and maternal morbidity, even death. Therefore, careful monitoring of mothers with COVID-19 and their neonates for possible complications is required. This information can be used to make policies on neonatal SARS-CoV-2 testing, healthcare organization for neonates born to SARS-CoV-2 positive women, and counselling of families regarding various management options.

## 6. Conflict of Interest

None.

## 7. Source of Funding


None.

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